gastro-intestinal and the central nervous systems, and that other organs or systems are but rarely affected; thirdly, and not least important, that the cases supposed to be malaria should in the future be more carefully studied, and that hereafter it should not be given as a cause of existing evils without sufficient and abundant proof. If the blood cannot be examined then only a full history of the case should be accepted in which the fever, spleen, and effects of treatment are carefully noted.

I will close by a brief quotation from Laveran's work; he says: "This great frequency of accidents occurring in malaria has been much exaggerated; some observers have come to attribute numberless complications to it, and in the diseases of the warm countries see, so to speak, only various types of malaria. Authors have described an ophthalmia, a urethritis, a rheumatism, all due to malaria. . . . All diseases may be associated with malaria; the condition of anæmia and the feebleness which it rapidly brings about cause of themselves a true predisposition for certain affections like pneumonia and dysentery. . . . The error of those who attribute to malaria all the maladies which may complicate it, or even the greater number of those which have been observed in malarious countries, is certainly not small." This is as true now as when written in 1884, and does not speak well for the profession at large. The mistakes occur in all countries, but it is time their number was growing less rather than more.

ORIGINAL STUDIES IN THE BACTERIOLOGY OF CHRONIC ENDOMETRITIS.

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Before entering upon the study of the bacteriology of the uterine cavity it is important first to consider the bacteria of the vaginal tract. Kaltenbach has claimed that pathogenic micro-organisms are constantly present in the vaginas of pregnant women. Steffeck and Winter found in the vaginal secretions of pregnant women, even when they had not been examined for a long time, numerous varieties of bacteria, among which were pyogenic streptococci, staphylococci, and diplococci.

Ahlfeld claimed that the vagina of every woman contains bacteria which, under favorable circumstances, can be the cause of fever or, indeed, death.

Döderlin differentiated between normal and pathological vaginal secretion. The normal secretion, he claimed, gives a strongly acid reaction; the pathological secretion is feebly acid, neutral, or even alkaline. Bacteriological examination showed in the normal secretion almost exclusively a single variety of bacillus, which he has designated by the special name of bacillus vaginæ; while in the pathological secretion he found the greatest variety of organisms. including both cocci and bacilli. He found streptococci in 4.9 per cent. of these cases. He introduced into the vagina of a virgin, which normally contained the bacillus vaginæ in pure culture, pure cultures of the staphylococcus aureus. After four days all of the staphylococci had disappeared.

Krönig (*Deutsche med. Wochenschrift*, No. 43, 1894) has found that if nothing is introduced into the normal human vagina for two or three days, it undergoes spontaneous sterilization of all germs except the vaginal bacillus of Döderlin. He introduced pure cultures of the bacillus pyocyaneus into the vagina in twenty cases, and found that they had entirely disappeared in from fourteen to thirty hours.

The experiments of Menge (*Deutsche med. Wochenschrift*, No. 46, 1894) show the same bactericidal property of vaginal secretion. He found that staphylococci and streptococci were killed in from two and one-half to seventy hours, irrespective of the reaction of the secretion.

Although the results of these experiments are at variance, the observations of Döderlin, Krönig, and Menge have been made with such care and with the advantage of the more recent methods of research, and involve such a large number of cases, that we may assume that they demonstrate the real condition of things. We may assume that the healthy vagina has the power of destroying the ordinary pathogenic bacteria, that when organisms are introduced from without they perish in a few hours or days, and that the only organism capable of withstanding the bactericidal action of the vagina is the benign bacillus vaginæ of Döderlin. As an exception, may be mentioned the gonococcus of Neisser, which is capable of multiplying in the presence of vaginal secretion; and certain other less common organisms which do not enter into the etiology of the ordinary chronic endometritis.

In the uterine canal other conditions are encountered, the chief of which are a difference in the chemical reaction of the secretions and a difference in the anatomical structure of the mucosa. But few reports of studies of the bacteria of the uterine cavity are to be found in literature, and those, unfortunately, show very variable results.

In 1887 and 1888 Laplace (AMERICAN JOURNAL OF THE MEDICAL SCIENCES, 1892, vol. civ. p. 438) examined in Koch's laboratory the scrapings from the uteri of six healthy women. These scrapings were obtained by means of the platinum loop. All of the scrapings showed the presence of bacteria, the most common of which were the streptococci of suppuration. There were three varieties that could not be identified. Two of these, when injected into guinea-pigs, caused the death of the animal; the third was a harmless organism.

In cases of endocervicitis he found organisms to be very abundant;

and he identified streptococcus pyogenes, staphylococcus pyogenes aureus, albus, and citreus; a few of the bacillus pyocyaneus, and also many of the three above-mentioned unidentified varieties. He assumed that these organisms are constantly present, but that when the mucous membrane becomes inflamed they exist in much larger numbers. Finally he examined the scrapings from the uteri in six cases of chronic endometritis in the clinic of Prof. Martin, and found in all cases streptococci lodged in the depth of the tissues. He then proceeded to make the following deductions:

1. The normal endometrium of the uterus and cervix is a harbor for vast numbers of micro-organisms, most of which are known to us, but some still unknown yet possessing poisonous qualities for guinea-pigs.

2. The inflamed endometrium contains the same kinds of micro-organisms, but in vaster quantities, the superficial exfoliating cells also containing them.

3. In chronic endometritis the secretions contain about as many infectious organisms, the mucous membrane and fibrous tissue become greatly hypertrophied under the constant development of these organisms, and whether this chronic condition be simple or gonorrhœal, we find the germs both in the epithelial and fibrous tissue.

Contrast this with the more recent experiments of Menge, made in the Gynecological Clinic in Leipsic (*Deutsche med. Wochenschrift*, No. 48, 1894). In the cases of six women he introduced under strict precautions pure cultures of streptococci into the cervical canal. Microscopic examinations showed that the same changes took place as occurred in similar experiments in the vagina, namely, leucocytosis and phagocytosis. In an average of twelve hours all of the staphylococci had been destroyed. He believes that, with the exception of the gonococcus, bacteria cannot vegetate for any considerable length of time in the uterine canal.

To these observations I would add a series of studies which I have made in cases of chronic hypertrophic endometritis occurring in the service of Dr. L. S. Pilcher in the Seney Methodist Hospital in Brooklyn. The technique of my experiments was as follows: The patients were given daily vaginal douches for several days before the operation of curettement. After the patient had been anæsthetized, the vagina was scrubbed out with a gauze sponge smeared with soft-soap, while a constant irrigation of the vagina with boro-salicylic solution was kept up. The patient then being placed in the dorsal position, the vagina was dilated with retractors, the cervix drawn down with the tenaculum, and the external os wiped dry with a bit of sterilized gauze. The uterine canal was then dilated with the instruments of Ellinger and Goodell, and into its cavity was introduced a urethral endoscope of Grünfeldt. This is an instrument composed of a metallic tube fitted with a plunger which completely occludes its calibre, and which projects slightly beyond the end of the tube, the ends of both being smoothly rounded. This instrument was passed to the fundus of the uterus, and the piston withdrawn. A small, sharp curette was then passed up through the tube to the fundus, and a bit of the mucosa scraped away. This bit of tissue, with some blood and mucus, was introduced into a tube of warm beef-bouillon-gelatin, slightly agitated to distribute the material, and either poured into a Petri dish or made into an Esmarch roll. All of the instruments used in the operation had been sterilized by boiling in soda solution. This procedure was carefully carried out in seventeen cases of chronic hypertrophic endometritis. Twelve of the plates gave no growth. Of the remaining five, one showed pure culture of staphylococcus pyogenes aureus in very large numbers; a second showed staphylococcus pyogenes aureus and an organism somewhat resembling proteus vulgaris; a third showed bacteria uræ; a fourth showed pure cultures of staphylococcus pyogenes albus, and a fifth showed the same germ as the fourth.

One of the most important facts in all these observations is that in no case was there a growth from the shreds or pieces of mucous membrane which lay embedded in the gelatin. In the cases in which there was a growth of bacterial colonies in the culture medium, the growth never showed any especial relation or connection to the implanted uterine tissue. This is one very strong reason for believing that these organisms do not bear an etiological relation to the chronic endometritis. Their absence in 71 per cent. of the cases is another strong evidence of their innocence. In order to account for their presence we must bear in mind that all of these cases had been subjected to repeated examinations and manipulations before and after admission to the hospital. The passage of the uterine sound might carry into the canal organisms which had been deposited in the mucus at the external os by the examining finger or other instrument. Or, indeed, such germs might have lain enveloped in the mucus at the os externum, protected by the chink in the torn cervix, for in all but one of these cases there was a laceration of the neck of the womb, and, not having been removed by the scrubbing and irrigation, have been carried up by the dilator or endoscope on its introduction. According to the investigations quoted above, the presence of such organisms would give no symptoms, for the reason that they were not only not proliferating, but were in process of extinction. It is a matter of much importance that the cervices and perinea which were repaired in these cases healed primarily, just as in the cases in which the bacterial findings were negative; nor was there any more post-operative rise of temperature.

The results of these observations are at variance with those of Laplace, who found virulent bacteria not only in the chronically inflamed uterus but in the healthy uterus as well. If my experiments have been defective, the cause of such defect must be sought in the culture media employed. The removal of material for study was much more radical in my cases than in those of Laplace; and if the mucosa was infiltrated with bacteria, as is claimed by him, I certainly implanted them in my culture media. The question of error in the culture media may be eliminated, for the reason that in this same preparation of beef-peptone-bouillon-gelatin I have grown luxuriantly the pyogenic organisms which he claims to have found in the uterine canal.

Another reason arguing for the view that these virulent organisms are not present in chronic endometritis is that I am personally aware of three cases of perforation of the uterus by the sharp curette during the operation of curettage for this condition; and yet in not one of these cases did any sign of peritonitis, fever, or any other untoward symptom develop. In the Leipsic clinic twenty-eight myoma operations have been done by the modified method of Zweifel without any attempt to cleanse the cervical canal, and no bad results have been observed.

On the other hand, my observations are in harmony with those of Krönig and Menge. As a clinical fact, we know that under certain conditions the pyogenic streptococci and staphylococci may give rise to inflammatory processes in the female genital tract, but we know also that these inflammations are always of the acute type, and experimental research has demonstrated that these organisms are not capable of producing a non-febrile, slowly progressing, chronic inflammation. In many cases of chronic endometritis there has never been an acute inflammatory process, but the disease has come on gradually and insidiously. Although we have been able to find no micro-organism in the fully developed stage of the disease, yet we are in no position to declare that bacteria play no etiological *rôle*. We do know that after acute inflammations of the uterus and adnexa due to the gonococcus of Neisser, or to the organisms which produce the fever of the puerperal state, chronic inflammatory changes supervene; but whether some form of bacterial infection is necessary for the production of these changes is questionable, and, indeed, improbable.

From conclusions based upon the study of a large number of sections of uteri the seat of chronic endometritis, I am convinced that it is no more necessary to seek for a microbic origin in chronic endometritis than in chronic degeneration of any of the other glandular organs. The glandular portion of the uterus is made up of secreting epithelial cells resting upon a connective-tissue stroma, just as in the kidney, liver, or breast. Either one of these elements may become changed or increased through irritative or trophic disturbances without the presence of bacteria.